

INSTALLER and INSPECTOR QUICK-REFERENCE: 2025-NRCA-MCH-05-A

Air Economizer Controls and Exhaust Air Heat Recovery

Purpose and Scope of the Test

Functionally Testing an air economizer cycle verifies that the HVAC system uses outdoor air to satisfy space-cooling loads. There are two types of economizer controls: stand-alone packages and DDC controls. The stand-alone packages are commonly associated with small unitary rooftop HVAC equipment. DDC controls are typically associated with built-up or large packaged air handling systems.

Cooling fan systems > 33,000 Btu/hr or chilled-water cooling systems without a fan or that use induced airflow that has a cooling capacity greater than the systems listed in Table 140.4-E, may use an economizer to comply with prescriptive requirements in the Energy Code. Air economizers must be able to provide 100 percent of the design supply air quantity as outside air; water economizers must be able to provide 100 percent of the design cooling load at 50°F dry-bulb and 45°F wet-bulb and below.

Test trigger

Newly Constructed and Additions/Alterations: All new equipment with air economizer controls must comply unless they meet the condition below.

The in-field economizer functional tests do not have to be conducted for units that are factory-installed and certified operational by the manufacturer to the Energy Commission's (CEC) economizer quality control requirements. The conditions to be a certified "factory installed and calibrated economizer" and how to apply for CEC approval of a certification program are described in the Energy Code and on the [CEC website](http://www.energy.ca.gov/title24/equipment_cert/) (http://www.energy.ca.gov/title24/equipment_cert/).

Relevant Energy Code References and Required Compliance Documents

Title 24, Part 6 of the California Building Standards Code, Building Energy Efficiency Standards (Energy Code) sections 120.5(a)4, 140.4(e), 140.4(g), 160.3(d)1D, 170.2(c)4C; Table 140.4-E; and JA6.3, NA7.5.4.

Who Can Perform the Test

This test must be performed by an acceptance test technician certified by a CEC-approved Acceptance Test Technician Certification Provider, using compliance document NRCA-MCH-05-A.

Required Tools

- Hand-held temperature probe (must be calibrated within the past year).
- Device capable of calculating enthalpy (must be calibrated within the past year).
- 1.2 kOhm resistor (when specified by the manufacturer).
- 620 Ohm resistor (when specified by the manufacturer).

**INSTALLER and INSPECTOR QUICK-REFERENCE:
2025-NRCA-MCH-05-A**

Air Economizer Controls and Exhaust Air Heat Recovery

Estimated Time to Complete Test

Construction Inspection: 0.5 to 1 hour (depending on familiarity with the controls).
Functional Testing: 0.5 to 2 hours (depending on familiarity with the controls and issues that arise during testing).

Potential Issues and Cautions

If conditions are below freezing when the test is performed, coil(s) may freeze when operating at 100 percent outdoor air.
Outdoor air and relief dampers should be closed when the system is in unoccupied and warm-up modes, preventing problems with unconditioned air entering the building during unoccupied hours.
If the damper interlocks fail and the outdoor air damper does not open before the return damper closes, damage to the air handling unit or associated duct work may occur.
Air economizers with poor mixing can have excessively stratified air streams that can cause comfort problems or freeze stat trips.¹ Mixing problems are more likely to occur as the VAV system reduces flow, leading to reduced velocities in the mixing box and through the dampers.
Check for exterior doors standing open and other signs of building over pressurization when all units are on full economizer cooling (100 percent OSA).
A freeze stat protects water coils in rooftop HVAC units from freezing. When a freeze stat trips it opens the hot water valve (either to full or partial) to remove the danger of damage from freezing water within the system. Typically freeze stats must be reset by hand. Poorly functioning air economizers can cause freeze stats to falsely trip or some cases may cause freezing conditions.

Inspection Enforcement

Verify the inspector is in receipt of one NRCA-MCH-05-A for EACH system that must demonstrate compliance. All NRCA forms for Mechanical Systems must have a water mark logo from a certified Mechanical ATTCP Provider.

Required:

**INSTALLER and INSPECTOR QUICK-REFERENCE:
2025-NRCA-MCH-05-A**

Air Economizer Controls and Exhaust Air Heat Recovery

Inspection Enforcement - continued

Required:

- Verify that the economizer manual and performance curves are kept at the location of the equipment.
- Verify that the economizer is set to the required High Limit setting according to the device type and climate zone per the table on the NRCA-MCH-05-A form.
- Verify that the economizer includes all reliability features as specified in the Energy Code.
- Verify that the economizer moves freely without binding.
- Verify that unitary systems with an economizer cycles compressors off when economizers can provide partial cooling.
- Verify that system controls fans, relief dampers, and dedicated relief fans to prevent building over pressurization in full economizer mode.
- Verify that either of the following are true:
 - For systems with DDC Controls, verify that the sensor used for locking out the economizer operation has been calibrated.
 - For other control systems, verify that the manufacturer's startup and testing procedures have been applied.

Due to advancements in economizer logic controls and Fault Detection and Diagnostics (FDD), resistor based enthalpy simulation methods are not used in modern controllers unless required by the manufacturer.

Optional:

Instruct the acceptance test technician to show the high limit setting on the economizer as compared to item 2 (Table 140.4-G) of the construction inspection portion of the NRCA-MCH-05-A form.

Acceptance Criteria

This is an operational controls pass-fail test, all required functional tests must pass. A copy of the manufacturer's certificate must be attached to the NRCA-MCH-05-A. Regardless of whether the economizer is field- or factory-installed, complete the construction inspection, including the compliance with high temperature lockout temperature setpoints.

Follow the **Construction Inspection** and **Functional Testing** instructions on either NRCA-MCH-05-A.